CENTRAL VALLEY REGIONAL
WATER QUALITY CONTROL BOARD

San Joaquin River Basin Rotational Sub-basin Monitoring:

Cosumnes, Mokelumne, and Calaveras River Watersheds, January – December 2002

Final February 2009

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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REGIONAL WATER QUALITY CONTROL BOARD
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ACKNOWLEDGEMENTS:

This report was made possible through countless hours of field and lab work, quality assurance, data compilation and data analysis, primarily performed by staff and students of the San Joaquin Watershed Unit. We would like in particular to thank Melissa Morris, Mary Hintze, Amy Criley, Susan Massey, Ann Pignitore, and Dana Kulesza for their work in all aspects of this monitoring program.

A portion of the funding for this monitoring effort was made possible through the California State Surface Water Ambient Monitoring Program (SWAMP). Additional resources were provided through the Agricultural Subsurface Drainage, Total Maximum Daily Load, and Watershed Management Initiative Programs.

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1.0 EXECUTIVE SUMMARY

From January through December 2002, the staff from the Central Valley Regional Water Quality Control Board initiated the first rotation of the Intensive Basin Program (IBP) as part of the Surface Water Ambient Monitoring Program (SWAMP) for the San Joaquin River. The IBP is the final layer in the 3-tiered monitoring framework developed as part of the San Joaquin River Basin SWAMP. In the first two tiers, the main stem of the San Joaquin River (SJR) and the major inflows to the river are monitored. During the IBP, the upper watersheds of the SJR are intensively monitored for one year on a rotational basis. The SJR Basin was divided into five sub-basins, based on similar management practices and hydrologies of each group of water bodies. (A full evaluation of each of the sub-basins is anticipated but dependent on available funding).

The purpose of each rotation is to identify current monitoring efforts within the sub-basin (agency and local) as well as any local water quality concerns, evaluate spatial and temporal trends of key constituents, and determine whether there is any evidence that beneficial uses are not being protected. Resulting information will also be incorporated into the biannual statewide 305b assessment report.

This first phase of monitoring focused on the watersheds draining the east portion of the San Joaquin River Watershed, south of the American River Watershed and north of the Farmington Drainage Area. Specifically, this 4,360 square mile area, named the Northeast Basin, includes the Cosumnes, Mokelumne, and Calaveras River Watersheds. The main source of water for these watersheds is snowmelt from the Sierra Nevada. The basin represents diverse geography ranging in elevation from 18 to 11,750-ft as well as a variety of land uses (undisturbed, timber, grazing, urban, irrigated agricultural), and hydrologic management (from the unregulated Cosumnes River to the highly modified and regulated Mokelumne and Calaveras.

Prior to initial water quality sampling, 58 state, federal, and local agencies as well as known watershed groups were surveyed to identify current monitoring efforts and local concerns. Monitoring during the time of the study was limited to selected gages maintained by the California Department of Water Resources and US Geological Survey, and targetted studies conducted by the University of California and others. Data for the targeted studies was not readily accessible. Local concerns were focused on potential impacts to aquatic life and recreation in the upper watershed, in particular concerns with temperature, sedimentation, and pathogens, with additional concerns of irrigation supply (elevated salt) and drinking water (elevated total organic carbon) in the lower watershed. The final sampling design incorporated the initial survey findings.

Sampling within each basin was conducted twice a month for a twelve-month period. Core constituents sampled consisted of: temperature, turbidity, dissolved oxygen, pH, electrical conductivity, total Coliform and *E. coli*. As funding permitted, additional constituents were added: total suspended solids, total organic carbon, nutrients, trace elements, and water column toxicity. All information and water quality data for this project and other monitoring activities conducted under SWAMP in the San Joaquin River Basin are available within a year of sampling at the following web site:

http://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_studies/surface_water_ambient_monitoring/sjr_swamp.shtml

The San Joaquin River Index is used to classify water year type from 1 October through 30 September of the following year, based on total runoff (SWRCB, 1995). Sampling in the Northeast Basin coincided with the calendar year rather than water year; consequently the twelve months spanned two water years. Both 2001 and 2002 were classified as dry years.

During 2002, constituents monitored displayed distinct temporal and spatial variations. For instance temperature at all sites increased during the summer months regardless of flow and land use, as well as increased moving from upstream to downstream. Conversely, dissolved oxygen

decreased at all sites during the warmer summer months. Other constituents, such as electrical conductivity, TOC and E. coli displayed seasonal patterns and were greatly influenced by storm events. The magnitude of the influence increased if the site experienced a dry period. The pH was variable throughout the year, regardless of season or location in the watershed.

The reservoirs appeared to stabilize some of the variability seen in the upper watershed sites, particularly in the ephemeral streams. For instance, in the Cosumnes Watershed, EC concentrations tended to increase consistently moving downstream. In contrast, reservoirs in the Mokelumne and Calaveras Watersheds had lower overall EC than their tributaries, while the sites below the reservoirs reflected the reservoir concentrations. The only exceptions to this pattern were total suspended solids and E. coli, which both appear to increase moving downstream from the reservoirs—a pattern echoed moving downstream on the unregulated Cosumnes River.

In comparing data for each watershed, sites in the Cosumnes Watershed had the highest average readings for potassium (3.45 mg/L), turbidity (39.8 NTU), and total suspended solids (24 mg/L), and the lowest survival in a single data set for toxicity (55%). Sites in the Mokelumne River Watershed had the highest average measurement for total organic carbon (8.5 mg/L). Electrical conductivity over 100-umhos/cm was most prevalent in the Calaveras Watershed. The Calaveras Watershed also had the hardest water, with the mean ranging from 150-mg/L in the upper watershed to 80-mg/L in the lower, and the highest selenium result (Calaveritas Creek, at 1.02 ug/L).

When evaluated against water quality objectives (Basin Plan, 2002), goals (Marshack, 2006), targets (CALFED, 2000), and guidelines (USEPA Contact Recreation), the water quality results indicate that, in general, there is no evidence of impairment for the following beneficial uses: municipal supply, aquatic life, irrigation supply, and recreation.

Some areas of concern have been identified as follows.

Drinking Water/Municipal Supply: Elevated TOC concentrations during storm runoff are indicative of potential to impact downstream Delta waterways. Seasonally elevated levels of E. coli may indicate the presence of pathogens and require treatment prior to use for municipal supply.

Aquatic life: Although no specific impairment was identified, there is some concern with elevated temperatures in the downstream most reaches of each of the major rivers during the spring and fall migration seasons. The elevated temperatures mimic the trend for the Cosumnes River, therefore a more thorough temperature survey and comparison is needed prior to determining potential impairment.

Recreation: The Basin Plan identifies a fecal coliform objective of 400 MPN/100-ml, which may have been exceeded at selected sites based on analysis of *E.* coli, a subset of fecal coliform. These exceedances occurred primarily during storm events and/or periods outside of typical recreational swim period (May to October). Since our sampling included *E. coli* analysis instead of fecal coliform, data was compared to USEPA contact recreation guidelines which indicate use may be limited to light, full body contact at selected sites in the Cosumnes and Calaveras Rivers during May storm events and low flow August time periods.

Since this monitoring effort in the Northeast Basin (January through December 2002), monitoring plans have been finalized by the Water Quality Coalition within the Basin as part of the Regional Board's Irrigated Lands Program (ILP) and summary reports are available. Various coalition groups under the ILP have initiated studies to genetically identify sources of seasonally elevated levels of E. coli.

In addition, multiple stakeholder groups have formed to promote education, restoration, and address concerns by both agencies and individuals. In the Cosumnes Watershed, stakeholder groups include the Cosumnes River Task Force, Foothill Conservancy, American River

Conservancy and Cosumnes River Preserve. In the Mokelumne Watershed, stakeholder groups include the Alpine Watershed Group, Ebbetts Pass Forest Watch, Ebbetts Pass Rivers and Trail Alliance, Foothill Conservancy, Upper Mokelumne River Watershed Authority and Upper Mokelumne River Watershed Council. In the Calaveras River Watershed, the active stakeholder groups are the Foothill Conservancy, which is actively involved in issues affecting the quality of life and natural environment in Amador and Calaveras counties, and the Calaveras River Watershed Stakeholders Group, which has been developing a Habitat Restoration Plan for the Lower Calaveras River.

In 2004, the Cosumnes River Preserve was awarded a Proposition 50 Watershed Program grant to develop a comprehensive management plan for the Cosumnes River Preserve and the Upper Mokelumne River Watershed Authority was awarded the first of two Proposition 50 Watershed Program grants to develop a watershed assessment and management plan for the Upper Mokelumne Watershed. As part of the Upper Mokelumne Watershed project, a calibrated Watershed Analysis Risk Management Framework (WARMF) model has been developed which will provide analysis of the watershed to guide management decisions, simulating future watershed conditions.

Based on information collected during this project, future-monitoring efforts in this basin should consider:

- Coordinated monitoring with the Irrigated Lands Program and local stakeholder groups conducting grant funded and volunteer monitoring.
- Expanded temperature surveys in the lower watershed areas during spawning and migration periods.
- A study in the Sutter Creek Watershed in order to better evaluate *E. coli* and TOC concentrations potentially related to septic system waste and/or seepage from wastewater collection systems, including follow-up genetic tracer studies immediately after flushing storm events.
- Further evaluation of E. coli concentrations during the recreational season at local swimming holes.
- Addition of a site on Mormon Slough for comparison to Calaveras River @ Highway 88, to allow evaluation of the affects of intensive agriculture on a body of water versus source water to the same area.
- Additional bacteria studies to determine appropriate sampling methodology, inherent site variability and acceptable analytical precision.

Monitoring will continue on a monthly basis at the long-term SWAMP sites that were included in this program. Resulting data will be evaluated to focus further upper basin rotations.